Math 7
Prerequisite: Sixth Grade Mathematics

Students in Math 7 will study mathematics concepts from sixth grade in more depth and extend knowledge to basic prealgebra by conjecturing, verifying, thinking critically, and applying mathematical concepts. This course focuses on computation and estimation with rational numbers and emphasizes proportional reasoning. Students will investigate and explore mathematical ideas, develop multiple strategies for analyzing complex situations, and use calculators and mathematical software. Students will apply mathematical skills and make meaningful connections to life's experiences.

Standard I: Students will expand number sense to include operations with rational numbers.

Objective 1: Represent rational numbers in a variety of ways.
   a. Demonstrate multiple ways to represent whole numbers, decimals, fractions, percents, and integers using models and symbolic representations.
   b. Simplify numerical expressions with whole number exponents, and recognize that any positive number to the 0 power is 1.
   c. Represent numbers greater than one using scientific notation.
   d. Select the most appropriate form of a rational number for a given context.

Objective 2: Compare and order rational numbers, including positive and negative fractions, mixed numbers, and decimals.
   a. Identify, read, and locate rational numbers on a number line.
   b. Compare pairs of rational numbers in different forms.
   c. Order rational numbers with and without a number line.

Objective 3: Explain relationships and equivalencies among rational numbers.
   a. Find equivalent forms for common fractions, decimals, percents, and ratios, including repeating or terminating decimals.
   b. Predict the effect of operating with fractions, decimals, percents, and integers as an increase or a decrease of the original value.
   c. Recognize and use the identity properties of addition and multiplication, the multiplicative property of zero, and the commutative and associative properties of addition and multiplication, and the distributive property of multiplication over addition.
   d. Recognize and use the inverse operations of adding and subtracting a fixed number, multiplying and dividing by a fixed number, and computing squares of whole numbers and taking square roots of perfect squares.

Objective 4: Model and illustrate meanings of ratios and operations with rational numbers.
   a. Show how multiplication and division of whole numbers relates to multiplication and division of fractions.
   b. Show how the part-to-whole definition of ratios relates to the other definitions of ratios (i.e., part-to-part, division, and rate).
   c. Compare ratios using the unit rate.
   d. Recognize percents as ratios based on 100 and decimals as ratios based on powers of 10.
   e. Develop mental mathematical strategies using the properties of addition and multiplication.

Objective 5: Solve problems involving rational numbers.
   a. Compute fluently using all four operations with integers and positive fractions and decimals.
   b. Solve problems using factors, multiples, prime factorization, relatively prime numbers, and common divisibility rules.
   c. Solve application problems involving rational numbers.
   d. Determine if an answer is reasonable using estimation.

Objective 6: Solve problems involving ratios, rates, proportions and percentages.
   a. Solve ratio and rate problems using informal methods involving multiplication and division.
   b. Solve percent problems using ratio and proportion, including problems involving discounts, interest, taxes, tips, and percent increase or decrease.
   c. Solve problems involving rates and measures.

Mathematical Language and Symbols Students Should Use
whole number, decimal, fraction, percent, integer, exponent, scientific notation, rational number, ratio, rate, proportion, identity, commutative, associative, factor, multiple, prime, relatively prime

Standard II: Students will use the language of algebra to represent relationships.

Objective 1: Evaluate, simplify, and solve algebraic expressions and equations.
   a. Write a variable expression to identify pattern relationships, and use those expressions to make predictions.
   b. Translate verbal expressions into algebraic expressions.
   c. Simplify and evaluate algebraic expressions.
   d. Show that performing the same operation on both sides of an equation will produce an equivalent equation.
   e. Solve single-variable linear equations and inequalities of the form $ax + b = c$, $ax + b < c$, or $ax + b > c$.

Objective 2: Represent relationships using graphs, tables, and other models.
    a. Identify integer coordinates when given the graph of a point on a rectangular coordinate system.
    b. Graph ordered pairs of integers on a rectangular coordinate system.
    c. Model real-world problems using graphs, tables, equations, manipulatives, and pictures.

Mathematical Language and Symbols Students Should Use

variable expression, algebraic expression, equivalent, linear equation, linear inequality, rectangular coordinate system, ordered pair

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Standard III: Students will use spatial, logical, and proportional reasoning in measurement and geometry.

Objective 1: Draw, label, and describe attributes of geometric shapes to determine geometric relationships.
    a. Draw, label, and describe relationships among line segments, rays, lines, parallel lines, and perpendicular lines, including midpoint of a line segment.
    b. Draw, label, and describe relationships among vertical, adjacent, complementary, and supplementary angles.
    c. Draw, label, and describe attributes of angles, triangles, and quadrilaterals.

Objective 2: Apply the properties of proportionality to different units of measurement.
    a. Convert from one unit of measurement to an equivalent unit of measurement in the same system using a given conversion factor.
    b. Create and interpret scale drawings and approximate distance on maps using properties of similarity.
    c. Solve problems involving scale factors using ratios and proportions.

Mathematical Language and Symbols Students Should Use

line segment, ray, line, parallel, perpendicular, midpoint, vertical angles, adjacent angles, complementary angles, supplementary angles, conversion factor, scale drawing

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Objective 3: Determine measurements using appropriate tools and formulas.
    a. Estimate metric and customary measures using everyday objects and comparisons.
    b. Measure length, area, volume, and angles to appropriate levels of precision.
    c. Calculate the measurement of everyday objects using formulas for perimeters and areas of triangles and quadrilaterals, and circumferences and areas of circles.
    d. Calculate the measurement of everyday objects using formulas for surface area and volume of prisms and cylinders.

Standard IV: Students will draw conclusions using concepts of probability after organizing and analyzing a data set.

Objective 1: Display and compare data to make predictions and formulate conclusions.
   a. Display data using tables, scatter plots, and circle graphs.
   b. Compare two similar sets of data on the same graph.
   c. Compare two different kinds of graphs representing the same set of data.
   d. Propose and justify inferences and predictions based on data.

Objective 2: Use basic concepts of probability to determine the likelihood of an event and compare the results of various experiments.
   a. Write the results of a probability experiment as a fraction, ratio, or decimal, between zero and one, or percent, between zero and one hundred.
   b. Compare experimental results with theoretical results.
   c. Compare individual, small group, and large group results of a probability experiment.